



The Office of Naval Research Navy Undersea Research Program

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To attract more academically trained professionals into weapon/underwater vehicle-related research and thereby increase the “knowledge base” for undersea weapon and vehicle technologies, the Office of Naval Research (ONR) has created the Navy Undersea Research Program (NURP) to sponsor graduate-level research performed in collaboration with experienced personnel at Navy laboratories. The program supports a student and academic advisor at a university and under a separate contract, a “mentor” at a Navy laboratory. Students must be United States citizens and open to employment at a Navy laboratory upon graduation. Students are also expected to spend some portion of each year at the collaborating laboratory.

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Background	1
Program Structure and Activities	1
Funding.....	3
How to Submit a Proposal	4
NURP Points of Contact	5
Appendix A: NURP Charter	6
Appendix B: NURP Board of Visitors Charter	6
Appendix C: Roles and Responsibilities	7

Background

In 2000, the Naval Studies Board Committee for Undersea Weapons Science and Technology of the National Research Council issued the report *An Assessment of Undersea Weapons Science and Technology*.¹ The report summarized the Committee’s findings after assessing the state of the Navy’s undersea weapons program and evaluating the Navy-sponsored and non-Navy-sponsored research related to the development of future undersea weapons.

Aside from identifying the decade-long trend of decreasing defense spending by the United States for undersea weapons research, development and acquisition, the Committee also found that that the pool of technical experts in undersea weapons technology is diminishing:

“The knowledge-base pipeline is thin in academia, government, and industry because of the low levels of funding available to support research. Undersea weapon [science and technology] is not viewed as an attractive career path...”

To attract more academically trained professionals into weapon/underwater vehicle-related research and thereby increase the “knowledge base” for undersea weapon and underwater vehicle technologies, the Office of Naval Research (ONR) has created the Navy Undersea Research Program² (NURP) to sponsor graduate-level research performed in collaboration with experienced personnel at Navy laboratories and also University Affiliated Research Centers (UARCs). Furthermore, for the purpose of this program, the term “undersea weapons” includes not only conventional torpedoes, but also countermeasures and offensive systems such as submarine-launched mines and armed unmanned underwater vehicles (UUVs).

¹ Available from the Naval Studies Board, National Research Council, 2101 Constitution Avenue, N.W., Washington, DC 20418

² Prior to 2014 the program was known as the University Laboratory Initiative (ULI).

The federal government institutions include:

- Naval Air Systems Command
<http://www.navair.navy.mil>
- Naval Undersea Warfare Center- Newport Division
<http://www.navsea.navy.mil/nuwc/newport>
- Naval Undersea Warfare Center- Keyport Division
<http://www.navsea.navy.mil/nuwc/keyport>
- Naval Surface Warfare Center- Indian Head Division
<http://www.navsea.navy.mil/nswc/indianhead>
- Naval Surface Warfare Center- Dahlgren Division
<http://www.navsea.navy.mil/nswc/dahlgren>
- Naval Surface Warfare Center- Carderock Division
<http://www.navsea.navy.mil/nswc/carderock>
- Naval Surface Warfare Center- Crane Division
<http://www.navsea.navy.mil/nswc/crane>
- Naval Surface Warfare Center- Panama City Division
<http://www.navsea.navy.mil/nswc/panamacity>

The university laboratories include the following:

- Applied Research Laboratory- Penn State University
<http://www.arl.psu.edu>
- Applied Research Laboratory- University of Texas
<http://www.arlut.utexas.edu>
- Applied Research Laboratory- University of Washington
<http://www.apl.washington.edu>
- Applied Research Laboratory- Johns Hopkins University
<http://www.jhuapl.edu>
- Applied Research Laboratory- University of Hawaii at Manoa
<http://www.hawaii.edu/arl>

Program Structure and Activities

The NURP is part of the portfolio of weapon and vehicle technology programs administered by the ONR Sea Platforms and Weapons Division (Code 333). These programs fund basic and applied research projects in the following Undersea Weaponry Core Technology Areas:

- **Autonomy**
 - World Models
 - Distributed Control for Real-Time Tasking
 - Hybrid Control
- **Guidance and Control**
 - Sensors
 - Signal Processing
 - Planning and Control Algorithms
 - Signal Management for Undersea Distributed Network Systems (UDNS)

- **Weapon Energy Conversion**
 - Batteries, Air-Independent Fuel Cells and Hybrids
 - Motors
- **Vehicle Technology**
 - Batteries, Air-Independent Fuel Cells and Hybrids
 - Motors
 - Liquid Fuels (for “gas and go” concepts)
 - Corrosion and Anti-Fouling Coatings
- **Hydrodynamics**
 - Control Surfaces
 - Propulsors
 - Drag and Noise Reduction
 - Projectiles
- **Warheads**
 - Explosives
 - Detonators
 - Fuses

NURP goals, requirements, funding limits and meeting schedule are determined by a single ONR program officer who serves as the NURP Point of Contact. Projects funded under the program may be directly monitored by any one of the program officers administering programs in undersea weapons and vehicles technology or a related area.

Each year, customarily during the first full week in June, a program review is held during which students present either their proposed research projects (if a student is new to the program) or progress made under on-going projects during the past year. The purpose of this activity is to expose students to the review process commonly employed by Department of Defense program managers. During the review, the quality of the students’ work is reviewed by a Board of Visitors, an *ad hoc* group comprised of distinguished persons with a background in defense science and engineering, experience with undersea weapons technology or related systems, and an understanding of the academic environment. (See Appendix B.)

Requirements

1. Students must apply to the National Science Foundation’s (NSF) Graduate Fellowship Research Program (GFRP) and receive award of a fellowship. Further information can be found on NSF’s website: <http://www.nsfgrfp.org/>.
2. Students must be United States citizens.
3. For each NURP project involving a graduate student, three individuals are involved: a student, the student’s academic advisor and a “mentor” at a Navy laboratory. Projects involving a post-doctoral student do not require an academic advisor.
4. Once students are notified of the NSF fellowship award, they can apply for the NURP via NSF’s Graduate Research Internship Program (GRIP). This will qualify the student to receive an internship award for the time spent at the Navy Labs during the summer months.

5. Laboratory personnel participating in this program (laboratory mentors) are to interact with the student and play an active role in the development of a student's research proposal and its execution. It is expected that a student will spend some portion of each calendar year working at the collaborating laboratory via a summer internship or similar arrangement. This may require a student to obtain a security clearance. For more information on the roles and responsibilities of all NURP participants, refer to Appendix C.

Funding

Funds to the students will be provided in annual increments, by NSF. These increment amounts, as well as per-project limits, are subject to change according to year-to-year changes in funds made available to support the program. The duration of funding will depend upon the nature of the research and the degree pursued by student. Projects related to a student pursuing a doctorate are anticipated to be funded for three years, and for a master's degree, two years.

Funds to the Navy mentors will be provided by ONR, on an annual basis to match the student program. The funds directed to the associated Navy laboratory are for part-time support of the student's laboratory mentor, materials to support the project, travel, publication and possibly some or all of the student's salary while working at the laboratory.

NSF will provide a \$5,000 per year stipend to support the students, during their internship at the Navy laboratory.

How to Submit a Proposal

To formally pursue funding, the laboratory must submit a separate proposal to the assigned ONR program officer. If accepted, the assigned program officer will directly monitor and evaluate the technical progress of the research projects.

Students must be open to employment at the collaborating laboratory, or any laboratory that performs undersea-weapons research, upon completion of their degrees. A statement to this effect must be provided with each student's *Curriculum Vitae* (CV).

Guidance for submitting a proposal to ONR may be found on the ONR web site at: <http://www.onr.navy.mil/en/Contracts-Grants.aspx>. Additional information may be found in the document *Guidance for Preparing White Papers and Proposals* available from the NURP Point of Contact listed below.

White papers and proposals are generally submitted with reference to a Broad Agency Announcement (BAA), a written public announcement that ONR is positioned and willing to fund efforts to research and solve technical problems in a given topic. When submitting a white paper or proposal for consideration under the NURP, the Undersea Weaponry Science and Technology Program BAA should be referenced. If this BAA has expired, these documents may be submitted under ONR's Long-Range BAA. Current and expired BAAs may be found at the following web page: <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>.

NURP Time line

- | | |
|---------------------|--|
| 1) August | - NSF solicitation is for the GRFP is posted |
| 2) November | - NSF applications are due |
| 3) 27 November | - NSF reference letters due |
| 4) March-May | - NSF Recipients are announced |
| | - ONR offers recipients NURP option |
| 5) May 30 | - Deadline for submission of GRIP applications are due. Fellows submit GRIP applications through the GRFP FastLane module. |
| 6) June | - Acceptance of award and declaration of tenure are due to NSF |
| | - ONR selects NURP recipients and Navy Lab collaboration discussions take place |
| | - June 6: GRFP Coordinating Officials approve the Fellow applications in the GRFP FastLane module. |
| 7) June - September | - NSF Fellowship year begins |
| | - June 6 to July 1: GRIP applications are reviewed internally by NSF and by ONR 333 |
| 8) July | - NSF Announcement of internship awards |
| 9) October | - Navy Lab mentors receive ONR awards |

NURP Program Point of Contact

Maria G. Medeiros
Office of Naval Research, Code 333
875 North Randolph Street
Arlington, VA 22203-1995

Phone: 703-696-5034
E-mail: maria.medeiros1@navy.mil

Appendix A: NURP Charter

The mission of the Navy Undersea Research Program (NURP) is to attract academically trained professionals into weapon and/or vehicle-related research so as to increase the “knowledge base” for the United States Navy, helping to restore and revitalize the currently diminishing pool of technical experts in undersea weapons and vehicle technologies, as well as revitalize existing, and establish new, connections between Navy laboratories and academic institutions.

The mission will be accomplished by sponsoring graduate students who will perform their degree research in collaboration with experienced personnel at Navy laboratories or university laboratories that have a long-standing history of performing Navy-sponsored research. Students must seek degrees at either the masters, doctoral or post-doctoral level, and must be United States Citizens to be eligible for employment at defense research and development institutions upon graduation. Each student’s thesis research must be in, or related to, at least one of the following Undersea Weaponry Core Technology Areas: Guidance and Control, Energy Conversion, Hydrodynamics, UDNS, Corrosion/Antifouling, Alternate Fuels, and Warheads.

Appendix B: NURP Board of Visitors Charter

The Navy Undersea Research Program (NURP) Board of Visitors is an *ad hoc* group selected each year by the Office of Naval Research (ONR) to review the proposed and on-going research of the NURP students and make recommendations regarding the program’s structure, policy and execution. It will do this by attending the annual program review held each year. During each review, the Board is to consider the following questions:

1. Are the number and distribution of students among academic disciplines, as well as their research topics, appropriate to meet NURP goals?
2. Are the right institutions participating in the NURP?
3. What is the current state of undersea weapons science and technology, and related research and development activities and infrastructures, and will the NURP have any impact on them?

Board members should have backgrounds in engineering or applied science, experience in the technology of undersea weapons, or related systems, and an understanding of the academic environment. They should be individuals of vision, dedicated to the advancement of naval technology. They serve at the pleasure of ONR.

Appendix C: Roles and Responsibilities

Student

- Must provide proof of US Citizenship to ONR sponsor.
- Visit the participating navy lab/UARC prior to the start of the project to meet navy lab mentor and visit facilities where research will be conducted.
- Review and understand the objectives of the project and obtain copy of the proposal.
- Must spend at least 10 weeks during each summer of the project at navy lab/UARC facility. NREIP Summer Internship Program may be used for this internship- must apply by deadline.
- Meet or have a conference call with the navy lab mentor and professor to discuss the tasks to be performed during the 10-week summer internship period.
- Provide your navy lab mentor a copy of your resume at least one year prior to the NURP project completion date.
- Inquire about hiring status during summer internships with your navy lab mentor, Warfare Center CTO and/or URAC Director.
- If any issues arise with either the navy lab mentor and/or the professor notify the ONR sponsor.
- Attend the NURP Program Review annually and present research work.
- Keep up the good work.

Professor

- Visit the participating navy lab/UARC prior to the start of the project to meet navy lab mentor and visit facilities where research will be conducted.
- Develop a realistic timeline for the NURP project with both student and navy lab mentor prior to proposal submission. Keep in mind that the NURP supports a MS candidate for 2 years, a PhD candidate for 3 years and one student per project.
- Visit participating navy lab/UARC at least once a year during the length of the project.
- Meet or have a conference call with the student and navy lab mentor to discuss the student's summer internship period and the tasks to be performed during the 10 week period. This should be done prior to and after 10 week internship.
- NURP publications and presentations should include all participants. ONR sponsor approval must be obtained along with navy lab approval prior to any publication/presentation.
- If any issues arise with either the student and/or the navy lab mentor notify the ONR sponsor.
- Attend the NURP Program Review annually.
- Keep up the good work.

Navy Lab Mentor

- Meet both the student and professor prior to start of the NURP project.
- Provide to the student and the professor the "big picture" and overall requirements/objectives of your technology area with state-of-the-art technology and how the NURP project will meet these requirements, increase capability or advance the technology and why it is important to the Navy.
- Visit participating university at least once a year during the length of the project.

- Meet or have a conference call with the student and professor prior to the student's summer internship period to discuss tasks to be performed during the 10-week period. This should be done prior to and after 10-week internship.
- Meet with the student at least once per week during the student's summer internship period to discuss status of tasks.
- Inform student and professor of current and past competing technologies and discuss advantages of NURP technology approach.
- Introduce student and professor to your immediate supervisor and Warfare Center's Chief Technology Officer (CTO).
and/or UARC's Director and discuss hiring opportunities and the NURP project.
- Request student's resume at least one year prior to the NURP project completion date.
- Forward student's resume to immediate supervisor and Warfare Center's CTO and/or UARC's Director with a reminder of the student's expected graduation date.
- If any problems arise with either the student and/or the professor, notify the ONR sponsor.
- Attend the NURP Program Review annually.
- Keep up the good work.